

## CLAIMS

1. (currently amended) A method of operating a data processing network, comprising:

performing an initial link layer negotiation between a server ~~of the network~~ and a switch to which the server is connected, wherein the initial negotiation establishes an initial operating frequency of a network link between the server and the switch;

~~determining~~ following the initial network layer negotiation, measuring an effective data rate of the server based on network traffic communicated between the server and the switch over the network link; and

responsive to determining by the measuring that the effective data rate is materially less than below the capacity of a current bandwidth of the network link, performing a subsequent link layer negotiation to establish a modified operating frequency of the link, wherein the modified operating frequency is closer to the measured effective data rate than the initial operating frequency[[:]]

~~automatically repeating, at specified intervals during the operation of the network, the determination of the effective data rate and the contingent initiation of a subsequent negotiation to automatically and periodically modify the operating frequency to a lowest operating frequency compatible with the effective data rate.~~

2.-3. (canceled)

4. (currently amended) The method of claim 1, wherein the initial and subsequent link layer negotiations are compliant with the IEEE 802.3 standard.

5. (currently amended) The method of claim 1, wherein ~~determining~~ measuring the effective data rate includes accumulating information indicative of the amount of network traffic over the link during a specified interval and calculating an effective data rate based thereon.

6. (currently amended) The method of claim 1, further comprising, responsive to determining that the effective data rate is greater than a specified percentage of the current bandwidth of the

link, performing a subsequent link layer negotiation to establish a modified operating frequency, wherein the modified operating frequency is higher than the current operating frequency.

7. (currently amended) A data processing ~~system network~~, comprising:

~~a central switch;~~

~~a server device including~~ a processor, memory, and a network interface ~~card~~ connecting the server device to ~~the central a~~ switch via a link;

~~code means for performing~~ wherein the network interface performs an initial negotiation; ~~wherein the initial negotiation that~~ establishes an initial operating frequency of the link~~[[;]]~~ ~~and~~  
~~code means for determining~~ thereafter determines an effective data rate of the server based on network traffic ~~transmitted~~ communicated between the server and the switch over the link; and

~~code means for performing~~ wherein the network interface performs a subsequent negotiation to establish a modified operating frequency of the link responsive to determining that the effective data rate is materially different than a current bandwidth of the link allocated for use by the server, wherein the modified operating frequency is closer to the lowest operating frequency accommodated by the link that is sufficient to handle the effective data rate than the initial operating frequency; and

~~code means for automatically repeating, at specified intervals during the operation of the network, the determination of the effective data rate and the contingent initiation of a subsequent negotiation to automatically and periodically modify the operating frequency to a lowest operating frequency compatible with the effective data rate.~~

8.-9. (canceled)

10. (currently amended) The ~~network~~ data processing system of claim 7, wherein the initial and subsequent negotiation are compliant with the IEEE 802.3 standard.

11. (currently amended) The ~~network~~ data processing system of claim 7, wherein the code means for determining the effective data rate includes code means for accumulating information indicative of the amount of network traffic during a specified interval and calculating an effective data rate based thereon.

12. (currently amended) The ~~network~~ data processing system of claim 7, further comprising, code means for performing a subsequent negotiation to establish a modified operating frequency responsive to determining that the effective data rate is greater than a specified percentage of the current bandwidth, wherein the modified operating frequency is higher than the prior operating frequency.

13. (currently amended) The ~~network~~ data processing system of claim 7, wherein the initial and subsequent negotiations are initiated by the central switch.

14. (currently amended) The ~~network~~ data processing system of claim 7, wherein the initial and subsequent negotiations are initiated by the server device.

15. (currently amended) A data processing network ~~server device suitable for use in a server cluster,~~ comprising:

the data processing system of Claim 7;

the switch; and

the link.

~~at least one processor;~~

~~—— a system memory accessible to the processor;~~

~~—— a network interface card configured to connect the server device to a central switch over a link;~~

~~—— code means for performing an initial negotiation, wherein the initial negotiation establishes an initial operating frequency of the link;~~

~~—— code means for determining an effective data rate of the server based on network traffic transmitted over the link; and~~

~~—— code means for performing a subsequent negotiation to establish a modified operating frequency responsive to determining, that the effective data rate is different than the current bandwidth of the link, wherein the modified operating frequency is the lowest operating frequency accommodated by the link that is sufficient to handle the effective data rate;~~

~~—code means for automatically repeating, at specified intervals during the operation of the network, the determination of the effective data rate and the contingent initiation of a subsequent negotiation to automatically and periodically modify the operating frequency to a lowest operating frequency compatible with the effective data rate.~~

16.-20. (canceled)

21. (currently amended) A computer program product comprising:

a computer-readable storage medium;

computer executable instructions, stored on ~~[[a]]~~ the computer-readable storage medium, for conserving energy in a data processing network having a switch, a server, and a link connecting the switch to the server, the instructions comprising:

~~instructions for detecting that~~ detect whether or not the link is underutilized ~~including instructions for by:~~

determining an effective data rate of the server based on network traffic communication between the server and the switch; and

determining whether or not the effective data rate is materially different than that a capacity of a current bandwidth of the link allocated for use by the server is greater than an effective data rate of the link;

instructions that, responsive for responding to said detecting that the link is underutilized, performs a negotiation to establish a ~~by reducing an~~ reduced operating frequency of the link; and

~~—instructions for automatically repeating, at specified intervals, said instructions for detecting and said instruction for responding to automatically and periodically modify the operating frequency to a lowest operating frequency compatible with the effective data rate.~~

22. (currently amended) The computer program product of claim 21, ~~further comprising instructions for~~ wherein determining the effective data rate of the server includes determining link, ~~wherein the effective data is indicative of an amount of data traversing the link during a specified interval.~~

23. (previously presented) The computer program product of claim 22, further comprising:

instructions ~~for detecting that~~ detect whether or not the link is over-utilized ~~include instructions for determining that a current bandwidth of the link is less than an effective data rate of the link;~~ and

instructions that, responsive to ~~for responding to said~~ detecting that the link is over-utilized, increases ~~by increasing~~ an operating frequency of the link between the server and the switch.

24. (new) The method of claim 1, wherein the modified operating frequency is a lowest operating frequency accommodated by the link between the server and switch that is sufficient to handle the effective data rate.

25. (new) The method of claim 1, and further comprising:

automatically repeating, at specified intervals during the operation of the network, the determination of the effective data rate and contingent initiation of a subsequent negotiation to automatically and periodically modify the operating frequency to a lowest operating frequency compatible with the effective data rate.

26. (new) The method of claim 1, and further comprising:

in response to performing the subsequent link layer negotiation, decreasing an operating frequency and power consumption of a network interface of the server.

27. (new) The data processing system of claim 7, wherein the modified operating frequency is a lowest operating frequency accommodated by the link between the server and switch that is sufficient to handle the effective data rate.

28. (new) The data processing system of claim 7, wherein the network interface automatically repeats, at specified intervals during the operation of the link, the determination of the effective data rate and contingent initiation of a subsequent negotiation to automatically and periodically

modify the operating frequency to a lowest operating frequency compatible with the effective data rate.

29. (new) The data processing system of claim 7, wherein the network interface, responsive to performing the subsequent link layer negotiation, decreases its operating frequency and power consumption.

30. (new) The program product of claim 21, wherein the reduced operating frequency is a lowest operating frequency accommodated by the link between the server and switch that is sufficient to handle the effective data rate.

29. (new) The program product of claim 21, wherein the computer executable instructions automatically repeat, at specified intervals during the operation of the link, the determination of the effective data rate and contingent initiation of a subsequent negotiation to automatically reduce the operating frequency of the link.

30. (new) The data processing system of claim 21, wherein the instructions further include instructions that, responsive to performance of the subsequent link layer negotiation, decrease an operating frequency and power consumption of a network interface.